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L4: Entry 7 of 14 File: USPT Oct 13, 1998

DOCUMENT-IDENTIFIER: US 5820880 A
TITLE: Liposomal formulation

BSPR:
Thus, in one aspect, the invention is directed to a pharmaceutical composition comprising at least one antigen encapsulated in liposomes, along with a stabilizing agent effective to prevent the disruption of the liposomes which would otherwise occur in the presence of alum. The stabilizer is a nonionic detergent. The structural characteristics of the nonionic detergent are such that it mimics the interactive properties of certain polyoxyethylene sorbitan esters, commercially known as "Tweens." The esterified form of the Tween must contain less than 18 carbons in the acyl group and/or at least one .pi.-bond.

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Search Results -

Terms	Documents
pluacilamellar	0

Database: US Patents Full-Text Database; US Pre-Grant Publication Full-Text Database; JPO Abstracts Database; EPO Abstracts Database; Derwent World Patents Index; IBM Technical Disclosure Bulletins

Refine Search: pluacilamellar Clear

Search History

Today's Date: 9/11/2001

DB Name	Query	Hit Count	Set Name
USPT,JPAB,EPAB,DWPI,TDBD	pluacilamellar	0	L8
USPT,JPAB,EPAB,DWPI,TDBD	plaucilamellar	0	L7
USPT,JPAB,EPAB,DWPI,TDBD	puacilamellar	0	L6
USPT,JPAB,EPAB,DWPI,TDBD	liposome same (sucrose adj1 distearate)	0	L5
USPT,JPAB,EPAB,DWPI,TDBD	liposome same (sorbitan adj1 ester$)	14	L4
USPT,JPAB,EPAB,DWPI,TDBD	liposome same (sorbitan adj1 stearate)	2	L3
USPT,JPAB,EPAB,DWPI,TDBD	l1 and polysorbate	76	L2
USPT,JPAB,EPAB,DWPI,TDBD	liposome$ same (sorbitan stearate)	494	L1

L10: Entry 70 of 135 File: USPT Jul 1, 1997

US-PAT-NO: 5643600
DOCUMENT-IDENTIFIER: US 5643600 A

TITLE: Lipid vesicles containing avocado oil unsaponifiables

DATE-ISSUED: July 1, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mathur; Rajiv	Sewell	NJ	N/A	N/A

US-CL-CURRENT: 424/450; 424/401, 428/402.2

CLAIMS:

What is claimed is:
1. A paucilamellar lipid vesicle having 2-10 bilayers surrounding an amorphous oil-filled central cavity, wherein each of said bilayers contains at least one non-phospholipid amphiphile selected from the group consisting of polyoxyethylene fatty esters, polyoxyethylene fatty acid ethers, diethanolamides, long chain acyl hexosamides, long chain acyl amino acid amides, long chain acyl amides, POE (20) sorbitan mono- or trioletate, and glycerol monostearate as the primary lipid in said bilayers and phytosterol supplied by avocado oil unsaponifiables, said avocado oil unsaponifiables partitioning in manufacture of said paucilamellar lipid vesicles, so that a sufficient amount of the phytosterol from said avocado oil unsaponifiables goes into said bilayers so as to stabilize said bilayers and the remainder of said avocado oil unsaponifiables goes into said amorphous central cavity.
2. The paucilamellar vesicle of claim 1, wherein said polyoxyethylene fatty esters have the formula
R.sub.1 --COO(C.sub.2 H.sub.4 O).sub.n H
where R.sub.1 is lauric, myristic, cetyl, stearic, or oleic acid, and n32 2-10; said polyoxyethylene fatty acid ethers have the formula
R.sub.2 --CO(C.sub.2 H.sub.4).sub.m H
where R.sub.2 is lauric, myristic or cetyl acids, single or double unsaturated octadecyl acids, or double unsaturated eicodienoic acids and m ranges from 2-4; said diethanolamides have the formula
(HOCH.sub.2 --CH.sub.2).sub.2 NCO--R.sub.3
where R3 is caprylic, lauric, myristic, or linoleic acids;
said long chain acyl hexosamides have the formula
R.sub.4 --NHCO--(CH.sub.2).sub.b --CH.sub.3
where b ranges from 10-18 and R.sub.4 is a sugar molecule selected from a group consisting of glucosamine, galactosamine, and N-methylglucamine;
said long chain acyl amino acid amides have the formula
R.sub.5 --CH(COOH)--NHCO--(CH.sub.2).sub.c --CH.sub.3
where c ranges from 10-18 and R.sub.5 is an amino acid side chain;
said long chain acyl amides have the formula
HOOC--(CH.sub.2).sub.d --N(CH.sub.3)--(CH.sub.2).sub.3--NCHO--R.sub.6
where R.sub.6 is an acyl chain having 10-20 carbons and not more than two unsaturations, and d ranges from 1-3.
3. The paucilamellar vesicle of claim 2, wherein said bilayers further comprise a second material selected from the group consisting of phospholipids, glycolipids, and mixtures thereof.

4. The paucilamellar lipid vesicle of claim 1, wherein said primary non-phospholipid amphiphile is selected from the group consisting of betaines and anionic sarcosinamides.
5. The paucilamellar lipid vesicle of claim 1, wherein said primary non-phospholipid amphiphile is selected from the group consisting of C.sub.12 -C.sub.18 fatty alcohols, C.sub.12 -C.sub.18 glycol monoesters, C.sub.12 -C.sub.18 glyceryl mono- and diesters, propylene glycol stearate, sucrose distearate, and mixtures thereof; and wherein said bilayers further comprise a second non-phospholipid amphiphile selected from the group consisting of quaternary dimethyldiacyl amines, polyoxyethylene acyl alcohols, polyglycerols, sorbitan fatty acid esters, polyoxyethylene derivatives of sorbitan fatty acid esters, fatty acids and their salts, and mixtures thereof.
6. The paucilamellar lipid vesicle of claim 5, wherein said primary non-phospholipid amphiphile is selected from the group consisting of C16-C18 fatty alcohols, glycol stearate, glyceryl mono- and distearate, glyceryl dilaurate, and mixtures thereof.
7. The paucilamellar lipid vesicle of claim 5 wherein said second non-phospholipid amphiphile is selected from the group consisting of stearyl alcohol, polyoxyethylene fatty alcohols, polyoxyethylene derivatives of sorbitan fatty acid esters having 10-20 oxyethylene groups, and mixtures thereof; wherein the fatty alcohol or fatty acid groups of the polyoxyethylene fatty alcohols and the polyoxyethylene derivatives of sorbitan fatty acid esters are selected from the group consisting of radicals of palmitic acid, stearic acid, lauric acid, and oleic acid, and mixtures thereof.

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L10: Entry 73 of 135 File: USPT May 13, 1997

DOCUMENT-IDENTIFIER: US 5628936 A
TITLE: Hybrid paucilamellar lipid vesicles

INNM:
Wallach; Donald F. H.

INZZ:
Wallach; Donald F. H.

CCXR:
424/450

URNM:
Wallach

URNM:
Wallach

URNM:
Wallach

URNM:
Wallach

URNM:
Wallach

URNM:
Wallach

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Search Results - Record(s) 1 through 30 of 46 returned.

☐ 1. Document ID: US 6251425 B1

L13: Entry 1 of 46 File: USPT Jun 26, 2001

US-PAT-NO: 6251425
DOCUMENT-IDENTIFIER: US 6251425 B1

TITLE: Glucoside paucilamellar vesicles

DATE-ISSUED: June 26, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mathur; Rajiv	Sewell	NJ	N/A	N/A

US-CL-CURRENT: 424/450; 424/401, 428/402.2, 514/725

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw Desc | Image

☐ 2. Document ID: US 6193997 B1

L13: Entry 2 of 46 File: USPT Feb 27, 2001

US-PAT-NO: 6193997
DOCUMENT-IDENTIFIER: US 6193997 B1

TITLE: Proteinic drug delivery system using membrane mimetics

DATE-ISSUED: February 27, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Modi; Pankaj	Ancaster	N/A	N/A	CAX

US-CL-CURRENT: 424/450; 424/130.1, 424/184.1, 424/198.1, 424/400, 424/434, 424/45, 424/464

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw Desc | Image

☐ 3. Document ID: US 6103271 A

L13: Entry 3 of 46 File: USPT Aug 15, 2000

US-PAT-NO: 6103271
DOCUMENT-IDENTIFIER: US 6103271 A

TITLE: Microencapsulation and electrostatic processing method

DATE-ISSUED: August 15, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Morrison; Dennis R.	Kemah	TX	N/A	N/A
Mosier; Benjamin	Houston	TX	N/A	N/A

US-CL-CURRENT: 424/490; 264/4.32, 264/4.33, 424/450, 424/489, 424/491, 424/497, 424/498, 427/213.3, 428/402.21, 428/402.24, 514/772.3, 514/773

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

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☐ 4. Document ID: US 6099864 A

L13: Entry 4 of 46 File: USPT Aug 8, 2000

US-PAT-NO: 6099864
DOCUMENT-IDENTIFIER: US 6099864 A

TITLE: In situ activation of microcapsules

DATE-ISSUED: August 8, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Morrison; Dennis R.	Kemah	TX	N/A	N/A
Mosier; Benjamin	Houston	TX	N/A	N/A

US-CL-CURRENT: 424/489; 264/4.1, 264/4.3, 264/4.32, 264/4.33, 424/423, 424/450, 428/402.2, 428/402.21, 514/951

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

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☐ 5. Document ID: US 6068847 A

L13: Entry 5 of 46 File: USPT May 30, 2000

US-PAT-NO: 6068847
DOCUMENT-IDENTIFIER: US 6068847 A

TITLE: Cosmetic compositions

DATE-ISSUED: May 30, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Aleles; Margaret	Gladstone	NJ	N/A	N/A
Kaminski; Claudia	Milford	NJ	N/A	N/A
Cole; Curtis A.	Langhorne	PA	N/A	N/A

US-CL-CURRENT: 424/401; 424/450, 514/725, 514/844, 514/846, 514/937

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw. Desc | Image

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☐ 6. Document ID: US 6022561 A

L13: Entry 6 of 46 File: USPT Feb 8, 2000

US-PAT-NO: 6022561
DOCUMENT-IDENTIFIER: US 6022561 A

TITLE: Bilayers preparations

DATE-ISSUED: February 8, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Carlsson; Anders	Stockholm	N/A	N/A	SEX
Herslof; Bengt	Stockholm	N/A	N/A	SEX
Petrovic-Kallholm; Snezana	Sp.ang.nga	N/A	N/A	SEX

US-CL-CURRENT: 424/450; 424/401, 424/427, 424/430, 424/434, 424/436

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw. Desc | Image

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☐ 7. Document ID: US 5993851 A

L13: Entry 7 of 46 File: USPT Nov 30, 1999

US-PAT-NO: 5993851
DOCUMENT-IDENTIFIER: US 5993851 A

TITLE: Method for preparing biphasic multilamellar lipid vesicles

DATE-ISSUED: November 30, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Foldvari; Marianna	Saskatoon	N/A	N/A	CAX

US-CL-CURRENT: 424/450; 264/4.1, 264/4.3, 264/4.32, 264/4.6, 424/1.21, 424/417, 424/85.7, 424/9.321, 424/9.51

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw. Desc | Image

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☐ 8. Document ID: US 5910306 A

L13: Entry 8 of 46 File: USPT Jun 8, 1999

US-PAT-NO: 5910306
DOCUMENT-IDENTIFIER: US 5910306 A

TITLE: Transdermal delivery system for antigen

DATE-ISSUED: June 8, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Alving; Carl R.	Bethesda	MD	N/A	N/A
Glenn; Gregory M.	Bethesda	MD	N/A	N/A

US-CL-CURRENT: 424/184.1; 424/204.1, 424/234.1, 424/265.1, 424/269.1, 424/274.1, 424/277.1, 424/279.1, 424/282.1, 424/283.1, 424/449, 424/450, 424/810, 424/812

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw. Desc | Image

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☐ 9. Document ID: US 5853755 A

L13: Entry 9 of 46 File: USPT Dec 29, 1998

US-PAT-NO: 5853755
DOCUMENT-IDENTIFIER: US 5853755 A

TITLE: Biphasic multilamellar lipid vesicles

DATE-ISSUED: December 29, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Foldvari; Marianna	Saskatoon	N/A	N/A	CAX

US-CL-CURRENT: 424/450; 264/4.1, 264/4.3, 264/4.32, 264/4.6, 424/1.21, 424/417, 424/9.321, 424/9.51, 428/402.2

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

☐ 10. Document ID: US 5846551 A

L13: Entry 10 of 46 File: USPT Dec 8, 1998

US-PAT-NO: 5846551
DOCUMENT-IDENTIFIER: US 5846551 A

TITLE: Water-based makeup compositions and methods for their preparation

DATE-ISSUED: December 8, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
DaCunha; Kathleen	Stamford	CT	N/A	N/A
McKenna; Linda	North Babylon	NY	N/A	N/A
Chant; David	Bayport	NY	N/A	N/A
Jennings; Deborah	Huntington	NY	N/A	N/A

US-CL-CURRENT: 424/401; 424/450, 424/489, 424/490, 424/63, 424/78.03

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

☐ 11. Document ID: US 5827531 A

L13: Entry 11 of 46 File: USPT Oct 27, 1998

US-PAT-NO: 5827531
DOCUMENT-IDENTIFIER: US 5827531 A

TITLE: Microcapsules and methods for making

DATE-ISSUED: October 27, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Morrison; Dennis R.	Kemah	TX	N/A	N/A
Mosier; Benjamin	Houston	TX	N/A	N/A

US-CL-CURRENT: 424/450; 264/4.32, 264/4.33, 424/451, 424/489, 424/490, 427/213.3, 428/402.21, 428/402.24

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

☐ 12. Document ID: US 5730989 A

L13: Entry 12 of 46 File: USPT Mar 24, 1998

US-PAT-NO: 5730989
DOCUMENT-IDENTIFIER: US 5730989 A

TITLE: Oral vaccine against gram negative bacterial infection

DATE-ISSUED: March 24, 1998

INVENTOR-INFORMATION:				
NAME	CITY	STATE	ZIP CODE	COUNTRY
Wright; D. Craig	Gaithersburg	MD	N/A	N/A

US-CL-CURRENT: 424/241.1; 424/197.11, 424/249.1, 424/255.1, 424/258.1, 424/261.1, 424/450

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

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☐ 13. Document ID: US 5665380 A

L13: Entry 13 of 46 File: USPT Sep 9, 1997

US-PAT-NO: 5665380
DOCUMENT-IDENTIFIER: US 5665380 A

TITLE: Lipid vesicle fusion as a method of transmitting a biologically active material to a cell

DATE-ISSUED: September 9, 1997

INVENTOR-INFORMATION:				
NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Hollis	NH	N/A	N/A
Varanelli; Carole	Chester	NH	N/A	N/A

US-CL-CURRENT: 424/450; 428/402.2, 514/44, 514/8

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

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☐ 14. Document ID: US 5662957 A

L13: Entry 14 of 46 File: USPT Sep 2, 1997

US-PAT-NO: 5662957
DOCUMENT-IDENTIFIER: US 5662957 A

TITLE: Oil containing lipid vesicles with marine applications

DATE-ISSUED: September 2, 1997

INVENTOR-INFORMATION:				
NAME	CITY	STATE	ZIP CODE	COUNTRY
Wright; D. Craig	Gaithersburg	MD	N/A	N/A

US-CL-CURRENT: 426/605; 424/442, 424/450, 426/612, 426/613, 514/938

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

☐ 15. Document ID: US 5643600 A

L13: Entry 15 of 46 File: USPT Jul 1, 1997

US-PAT-NO: 5643600
DOCUMENT-IDENTIFIER: US 5643600 A

TITLE: Lipid vesicles containing avocado oil unsaponifiables

DATE-ISSUED: July 1, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mathur; Rajiv	Sewell	NJ	N/A	N/A

US-CL-CURRENT: 424/450; 424/401, 428/402.2

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

☐ 16. Document ID: US 5628936 A

L13: Entry 16 of 46 File: USPT May 13, 1997

US-PAT-NO: 5628936
DOCUMENT-IDENTIFIER: US 5628936 A

TITLE: Hybrid paucilamellar lipid vesicles

DATE-ISSUED: May 13, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 264/4.1; 424/450, 428/402.2, 436/829

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

☐ 17. Document ID: US 5576017 A

L13: Entry 17 of 46 File: USPT Nov 19, 1996

US-PAT-NO: 5576017
DOCUMENT-IDENTIFIER: US 5576017 A

TITLE: Heterovesicular liposomes

DATE-ISSUED: November 19, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kim; Sinil	Solana Beach	CA	N/A	N/A

US-CL-CURRENT: 424/450; 264/4.1, 264/4.3, 436/829

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw. Desc | Image

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☐ 18. Document ID: US 5561062 A

L13: Entry 18 of 46 File: USPT Oct 1, 1996

US-PAT-NO: 5561062
DOCUMENT-IDENTIFIER: US 5561062 A

TITLE: Method of inhibiting viral reproduction using non-phospholipid, paucilamellar liposomes

DATE-ISSUED: October 1, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Varanelli; Carol	Chester	NH	N/A	N/A
Kumar; Surendra	Vineland	NJ	N/A	N/A
Wallach; Donald F. H.	Hollis	NH	N/A	N/A

US-CL-CURRENT: 435/238; 424/450, 424/94.3, 435/236

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw. Desc | Image

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☐ 19. Document ID: US 5490985 A

L13: Entry 19 of 46 File: USPT Feb 13, 1996

US-PAT-NO: 5490985
DOCUMENT-IDENTIFIER: US 5490985 A

TITLE: Extended duration antacid product

DATE-ISSUED: February 13, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Hollis	NH	N/A	N/A
Mathur; Rajiv	Sewell	NJ	N/A	N/A
Philippot; Jean	St. Clement la Riviere	N/A	N/A	FRX
Kumar; Surendra	Vineland	NJ	N/A	N/A

US-CL-CURRENT: 424/450; 424/683, 424/684, 424/686, 424/690, 514/63

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

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☐ 20. Document ID: US 5474848 A

L13: Entry 20 of 46 File: USPT Dec 12, 1995

US-PAT-NO: 5474848
DOCUMENT-IDENTIFIER: US 5474848 A

TITLE: Paucilamellar lipid vesicles

DATE-ISSUED: December 12, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 428/402.2; 106/493, 424/420, 424/450, 436/829, 514/6, 514/963

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

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☐ 21. Document ID: US 5439967 A

L13: Entry 21 of 46 File: USPT Aug 8, 1995

US-PAT-NO: 5439967
DOCUMENT-IDENTIFIER: US 5439967 A

TITLE: Propylene glycol stearate vesicles

DATE-ISSUED: August 8, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mathur; Rajiv	Sewell	NJ	N/A	N/A

US-CL-CURRENT: 424/450; 428/402.2

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw. Desc | Image

☐ 22. Document ID: US 5422120 A

L13: Entry 22 of 46 File: USPT Jun 6, 1995

US-PAT-NO: 5422120
DOCUMENT-IDENTIFIER: US 5422120 A

TITLE: Heterovesicular liposomes

DATE-ISSUED: June 6, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kim; Sinil	Solana Beach	CA	N/A	N/A

US-CL-CURRENT: 424/450; 264/4.1, 264/4.3, 264/4.6, 436/829

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw. Desc | Image

☐ 23. Document ID: US 5405615 A

L13: Entry 23 of 46 File: USPT Apr 11, 1995

US-PAT-NO: 5405615
DOCUMENT-IDENTIFIER: US 5405615 A

TITLE: Sucrose distearate lipid vesicles

DATE-ISSUED: April 11, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mathur; Rajiv	Sewell	NJ	N/A	N/A

US-CL-CURRENT: 424/450; 428/402.2

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw. Desc | Image

☐ 24. Document ID: US 5328628 A

L13: Entry 24 of 46 File: USPT Jul 12, 1994

US-PAT-NO: 5328628
DOCUMENT-IDENTIFIER: US 5328628 A

TITLE: Detergent compositions containing liposomes and process therefor

DATE-ISSUED: July 12, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hart; Gerald L.	Surbiton	N/A	N/A	GBX
Ahmed; Anjum F.	Virginia Water	N/A	N/A	GBX
Charaf; Ursula K.	Racine	WI	N/A	N/A

US-CL-CURRENT: 510/418; 264/4.3, 424/450, 428/402.2, 510/122, 510/123, 510/127, 510/158, 510/431, 510/468, 514/881

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

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☐ 25. Document ID: US 5260065 A

L13: Entry 25 of 46 File: USPT Nov 9, 1993

US-PAT-NO: 5260065
DOCUMENT-IDENTIFIER: US 5260065 A

TITLE: Blended lipid vesicles

DATE-ISSUED: November 9, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mathur; Rajiv	Nashua	NH	N/A	N/A
Wallach; Donald F. H.	Hollis	NH	N/A	N/A

US-CL-CURRENT: 424/450; 428/402.2

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw Desc | Image

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☐ 26. Document ID: US 5256422 A

L13: Entry 26 of 46 File: USPT Oct 26, 1993

US-PAT-NO: 5256422
DOCUMENT-IDENTIFIER: US 5256422 A

TITLE: Lipid vesicle containing water-in-oil emulsions

DATE-ISSUED: October 26, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Albert; Elizabeth C.	Nashua	NH	N/A	N/A
Wallach; Donald F. H.	Hollis	NH	N/A	N/A
Mathur; Rajiv	Nashua	NH	N/A	N/A

US-CL-CURRENT: 424/450; 424/401, 426/602, 426/603, 428/402.2, 514/937, 514/938, 514/941, 514/943

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWMC | Draw Desc | Image

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☐ 27. Document ID: US 5234767 A

L13: Entry 27 of 46 File: USPT Aug 10, 1993

US-PAT-NO: 5234767
DOCUMENT-IDENTIFIER: US 5234767 A

TITLE: Hybrid paucilamellar lipid vesicles

DATE-ISSUED: August 10, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 428/402.2; 264/4.1, 424/450, 436/829, 514/818

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

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☐ 28. Document ID: US 5229104 A

L13: Entry 28 of 46 File: USPT Jul 20, 1993

US-PAT-NO: 5229104
DOCUMENT-IDENTIFIER: US 5229104 A

TITLE: Artificial tanning compositions containing positively charged paucilamellar vesicles

DATE-ISSUED: July 20, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Sottery; John P.	Milford	CT	N/A	N/A
Deckner; George E.	Trumbull	CT	N/A	N/A

US-CL-CURRENT: 424/59; 424/195.18, 424/450, 424/60, 424/63, 424/757, 514/167, 514/251, 514/458, 514/474, 514/725, 514/847, 514/938

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

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☐ 29. Document ID: US 5219538 A

L13: Entry 29 of 46 File: USPT Jun 15, 1993

US-PAT-NO: 5219538
DOCUMENT-IDENTIFIER: US 5219538 A

TITLE: Gas and oxygen carrying lipid vesicles

DATE-ISSUED: June 15, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Henderson; Sheryl L.	Weare	NH	N/A	N/A
Wallach; Donald F. H.	Hollis	NH	N/A	N/A
Mathur; Rajiv	Nashua	NH	N/A	N/A

US-CL-CURRENT: 428/402.2; 106/312, 264/4.1, 264/4.3, 264/4.32, 264/4.33, 264/4.6, 264/4.7, 424/450, 436/829, 514/832

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

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☐ 30. Document ID: US 5213805 A

L13: Entry 30 of 46 File: USPT May 25, 1993

US-PAT-NO: 5213805
DOCUMENT-IDENTIFIER: US 5213805 A

TITLE: Lipid vesicles having N,N-dimethylamide derivatives as their primary lipid

DATE-ISSUED: May 25, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Hollis	NH	N/A	N/A
Mathur; Rajiv	Nashua	NH	N/A	N/A

US-CL-CURRENT: 424/450; 424/420, 428/402.2

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☐ 31. Document ID: US 5164191 A

L13: Entry 31 of 46 File: USPT Nov 17, 1992

US-PAT-NO: 5164191
DOCUMENT-IDENTIFIER: US 5164191 A

TITLE: Lipid vesicles having an alkyd as a wall-forming material

DATE-ISSUED: November 17, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Tabibi; S. Esmail	Chelmsford	MA	N/A	N/A
Chang; An-Cheng	Nashua	NH	N/A	N/A
Mathur; Rajiv	Nashua	NH	N/A	N/A
Wallach; Donald F. H.	Hollis	NH	N/A	N/A

US-CL-CURRENT: 424/450; 424/420, 424/501, 428/402.2, 554/164, 554/173, 554/227

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

☐ 32. Document ID: US 5160669 A

L13: Entry 32 of 46 File: USPT Nov 3, 1992

US-PAT-NO: 5160669
DOCUMENT-IDENTIFIER: US 5160669 A

TITLE: Method of making oil filled paucilamellar lipid vesicles

DATE-ISSUED: November 3, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Hollis	NH	N/A	N/A
Mathur; Rajiv	Nashua	NH	N/A	N/A

US-CL-CURRENT: 264/4.3; 424/450, 428/402.2

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

☐ 33. Document ID: US 5156766 A

L13: Entry 33 of 46 File: USPT Oct 20, 1992

US-PAT-NO: 5156766
DOCUMENT-IDENTIFIER: US 5156766 A

TITLE: Stabilized emulsion systems

DATE-ISSUED: October 20, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Behan; John M.	Kennington	N/A	N/A	GB3
Ness; Jeremy N.	Chartham	N/A	N/A	GB3
Perring; Keith D.	Ashford	N/A	N/A	GB3
Smith; William M.	Folkstone	N/A	N/A	GB3

US-CL-CURRENT: 516/54; 424/450, 510/104, 510/105, 510/159, 510/416, 516/73, 516/74, 516/900, 516/DIG.1

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

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☐ 34. Document ID: US 5147723 A

L13: Entry 34 of 46 File: USPT Sep 15, 1992

US-PAT-NO: 5147723
DOCUMENT-IDENTIFIER: US 5147723 A

TITLE: Paucilamellar lipid vesicles

DATE-ISSUED: September 15, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 428/402.2; 264/4.1, 424/184.1, 424/193.1, 424/196.11, 424/204.1, 424/216.1, 424/229.1, 424/280.1, 424/420 , 424/450, 436/829, 514/6, 514/963, 525/936

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

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☐ 35. Document ID: US 5145604 A

L13: Entry 35 of 46 File: USPT Sep 8, 1992

US-PAT-NO: 5145604
DOCUMENT-IDENTIFIER: US 5145604 A

TITLE: Aqueous emulsion and aerosol delivery system using same

DATE-ISSUED: September 8, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Neumiller; Phillip J.	Racine	WI	N/A	N/A

US-CL-CURRENT: 516/71; 424/450, 428/402.2, 514/938, 516/DIG.1

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

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☐ 36. Document ID: US 5104736 A

L13: Entry 36 of 46 File: USPT Apr 14, 1992

US-PAT-NO: 5104736
DOCUMENT-IDENTIFIER: US 5104736 A

TITLE: Reinforced paucilamellar lipid vesicles

DATE-ISSUED: April 14, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 428/402.2; 264/4.3, 264/4.32, 264/4.33, 264/4.7, 424/450, 436/829

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

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☐ 37. Document ID: US 5032457 A

L13: Entry 37 of 46 File: USPT Jul 16, 1991

US-PAT-NO: 5032457
DOCUMENT-IDENTIFIER: US 5032457 A

TITLE: Paucilamellar lipid vesicles using charge-localized, single chain, nonphospholipid surfactants

DATE-ISSUED: July 16, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 428/402.2; 264/4.1, 424/450, 436/829

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

☐ 38. Document ID: US 5023086 A

L13: Entry 38 of 46 File: USPT Jun 11, 1991

US-PAT-NO: 5023086
DOCUMENT-IDENTIFIER: US 5023086 A

TITLE: Encapsulated ionophore growth factors

DATE-ISSUED: June 11, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 424/450; 264/4.1, 428/402.2, 530/399

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw. Desc | Image

☐ 39. Document ID: US 5019392 A

L13: Entry 39 of 46 File: USPT May 28, 1991

US-PAT-NO: 5019392
DOCUMENT-IDENTIFIER: US 5019392 A

TITLE: Encapsulation of parasiticides

DATE-ISSUED: May 28, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 424/420; 264/4.1, 424/450, 428/402.2, 504/359, 514/963

Full | Title | Citation | Front | Review | Classification | Date | Reference KWIC | Draw. Desc | Image

☐ 40. Document ID: US 5019174 A

L13: Entry 40 of 46 File: USPT May 28, 1991

US-PAT-NO: 5019174
DOCUMENT-IDENTIFIER: US 5019174 A

TITLE: Removing oil from surfaces with liposomal cleaner

DATE-ISSUED: May 28, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 134/40; 134/42, 264/4.3, 424/450, 428/402.2, 510/137, 510/138, 510/159, 510/365, 510/417, 510/490, 510/502, 510/506, 514/846, 516/47

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw. Desc | Image

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☐ 41. Document ID: US 5013497 A

L13: Entry 41 of 46 File: USPT May 7, 1991

US-PAT-NO: 5013497
DOCUMENT-IDENTIFIER: US 5013497 A

TITLE: Method and apparatus for producing lipid vesicles

DATE-ISSUED: May 7, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Yiournas; Costas	Vineland	NJ	N/A	N/A
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 264/4.1; 264/4.6, 424/450, 514/963, 525/936

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw. Desc | Image

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☐ 42. Document ID: US 5000960 A

L13: Entry 42 of 46 File: USPT Mar 19, 1991

US-PAT-NO: 5000960
DOCUMENT-IDENTIFIER: US 5000960 A

TITLE: Protein coupling to lipid vesicles

DATE-ISSUED: March 19, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 424/1.21; 264/4.3, 424/179.1, 424/420, 424/450, 424/812, 424/9.3, 424/9.32, 424/9.321, 424/9.34, 424/9.4 , 428/402.2, 436/523, 436/526, 436/829, 514/963

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

☐ 43. Document ID: US 4942038 A

L13: Entry 43 of 46 File: USPT Jul 17, 1990

US-PAT-NO: 4942038
DOCUMENT-IDENTIFIER: US 4942038 A

TITLE: Encapsulated humectant

DATE-ISSUED: July 17, 1990

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 424/450; 252/194, 424/70.31, 424/DIG.4, 428/402.2, 510/160, 510/417, 510/438, 514/880, 514/881

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

☐ 44. Document ID: US 4911928 A

L13: Entry 44 of 46 File: USPT Mar 27, 1990

US-PAT-NO: 4911928
DOCUMENT-IDENTIFIER: US 4911928 A

TITLE: Paucilamellar lipid vesicles

DATE-ISSUED: March 27, 1990

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wallach; Donald F. H.	Brookline	MA	N/A	N/A

US-CL-CURRENT: 428/402.2; 264/4.1, 424/1.21, 424/420, 424/450, 424/812, 424/DIG.10, 436/829, 514/179, 514/6, 514/963, 525/936

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

☐ 45. Document ID: US 4241046 A

L13: Entry 45 of 46 File: USPT Dec 23, 1980

US-PAT-NO: 4241046
DOCUMENT-IDENTIFIER: US 4241046 A

TITLE: Method of encapsulating biologically active materials in lipid vesicles

DATE-ISSUED: December 23, 1980

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Papahadjopoulos; Demetrios P.	Williamsville	NY	14221	N/A
Szoka, Jr.; Francis C.	Buffalo	NY	14214	N/A

US-CL-CURRENT: 424/420; 424/450

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

☐ 46. Document ID: US 4235871 A

L13: Entry 46 of 46 File: USPT Nov 25, 1980

US-PAT-NO: 4235871
DOCUMENT-IDENTIFIER: US 4235871 A

TITLE: Method of encapsulating biologically active materials in lipid vesicles

DATE-ISSUED: November 25, 1980

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Papahadjopoulos; Demetrios P.	Williamsville	NY	14221	N/A
Szoka, Jr.; Francis C.	Buffalo	NY	14214	N/A

US-CL-CURRENT: 424/450; 264/4.6, 424/196.11, 424/197.11, 424/204.1, 424/234.1, 424/606, 424/812, 424/94.3, 424/94.6, 428/402.2

Full | Title | Citation | Front | Review | Classification | Date | Reference KWMC | Draw Desc | Image

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L1: Entry 29 of 57 File: USPT Mar 2, 1993

DOCUMENT-IDENTIFIER: US 5190762 A
TITLE: Method of administering proteins to living skin cells

BSPR:
The liposomes may be of various sizes and may have either one or several membrane layers separating the internal and external compartments. The most important elements in liposome structure are that a sufficient amount of enzyme be sequestered so that only one or a few liposomes are required to enter each cell for delivery of the DNA repair enzyme, and that the liposome be resistant to disruption. Liposome structures include small unilamellar vesicles (SUVs, less than 250 angstroms in diameter), large unilamellar vesicles (LUVs, greater than 500 angstroms in diameter), and multilamellar vesicles (MLs). In the examples presented below, SUVs are used to administer DNA repair enzymes. SUVs can be isolated from other liposomes and unincorporated enzyme by molecular sieve chromatograpy, which is precise but time consuming and dilutes the liposomes, or differential centrifugation, which is rapid but produces a wider range of liposome sizes.

L2: Entry 8 of 15 File: USPT Nov 22, 1994

DOCUMENT-IDENTIFIER: US 5366881 A
TITLE: Polymerizable lipids for preparing vesicles that controllably release an encapsulant

BSPR:
Lipid vesicles are generally made of materials having a high amphophilic lipid content, for example, surfactants or phospholipids. There are three general types of vesicles: (1) multilamellar vesicles (MLVs), which are onion-like structures having a series of substantially spherical shells formed of lipid bilayers interspersed with aqueous layers and ranging in diameter from about 0.1-4 .mu.m, (2) large unilamellar vesicles (LUVs) which have a lipid bilayer surrounding a large, unstructured aqueous phase and have a diameter of greater than 1 .mu.m, and (3) small unilamellar vesicles (SUVs) which are similar in structure to the LUVs except that their diameters are less than 0.2 .mu.m. MLVs are ideal for sustained release of reactive materials, while SUVs or LUVs are required for producing stimuli responsive carriers. LUVs are most desirable for the encapsulation of large molecules such as enzymes.

DEPR:
In another embodiment of this invention, polymerizable lipids of this invention, as defined above, are mixed with non-polymerizable lipids. The non-polymerizable lipids are selected from any non-polymerizable lipids, be they saturated phosphatidylcholines or other saturated lipids, although non-polymerizable phosphatidylcholines are preferred. In the mixtures, up to 90 mole percent, preferably up to 80 mole percent of the non-polymerizable lipid can be used. Examples of non-polymerizable lipids include cationic ammonium surfactants where the two alkyl chains contain 16 to 20 carbon atoms, phosphate surfactants, and saturated phospholipids or saturated phosphatidylcholines which contain the glyceryl backbone, two alkyl chains and a phosphate headgroup. Phosphate surfactants are not phospholipids because they do not contain the glyceryl backbone.

CLPL:
and said non-polymerizable lipid being selected from the group consisting of ammonium surfactants, phosphate surfactants, and saturated phosphatidylcholines.

CLPL:
said non-polymerizable lipid being selected from the group consisting of ammonium surfactants, phosphate surfactants, and saturated phosphatidylcholines;

L2: Entry 10 of 15 File: USPT May 21, 1991

DOCUMENT-IDENTIFIER: US 5017501 A
TITLE: Preparation of uniformly sized liposomes encapsulating an aqueous liquid

ABPL:
A dispersion of a uniformly sized population of multilamellar lipid vesicles (liposomes) encapsulating an aqueous liquid is prepared by forming a dried film of lipids on the walls of a vessel, contacting the film with an aqueous liquid in the presence of spherical contact masses such as glass beads and agitating. The liposomes have mean diameters in the range of about 150 to about 3000 nanometers and the contact masses have mean diameters of about 50 to 3,000 microns. The aqueous liquid encapsulated may contain enzymes, drugs or marker substances such as colorimetric or fluorescent dyes. A member of a immunological binding pair may be associated with the surfaces of the liposomes for carrying out immunoassays. This method allows for the use of small quantities of marker and lipid, leaves no residual solvents, allows for contact with only glass surfaces and involves no transfer of liposome preparations from lipid film drying vessels to sizing apparatus.

BSPR:
Presently preferred methods provide for liposomes which may be made from a variety of lipids and lipid conjugates, synthetic surfactants, alone or in combination, with or without membrane stabilizers such as cholesterol, and/or charge modifiers, such as phosphatidic acid, and anti-oxidants such as .alpha.-tocopherol, and the like, over a broad range of lipid concentrations, including the use of small to moderate amounts of lipid(s) and of marker substances, such as colorimetric or fluorescent dyes, enzymes, or drugs. Both smaller preparations, 1-50 ml, and larger batch preparations, greater than 1 liter, can be prepared by using the appropriate vessel size and agitation apparatus and the process is reproducible from preparation to preparation.

DEPR:
Similarly, while lipid films have been described comprised of sphingomyelin, cholesterol, stearic acid, and dipalmitoylphosphatidylethanolaminedigoxigenin, other lipids and lipid conjugates such as phosphatidylcholine, phosphatidylethanolamine, various glycolipids, single-chain lipids, fatty acids, dialkyltype synthetic surfactants, and the like may be used alone or in combination. These components may contain membrane stabilizers in addition to cholesterol, such as cholestanol and the like and/or charge modifiers, such as phosphatidic acid, dicetylphosphate, stearylamine, and anti-oxidants such as alpha-tocopherol, over a broad range of concentrations.

L2: Entry 11 of 15 File: USPT Aug 29, 1989

DOCUMENT-IDENTIFIER: US 4861597 A
TITLE: Novel functionallized liposomes and a process for production thereof

BSPR:
Since Bangham et al. found that when phospholipids which are surfactants derived from biomembranes were suspended in water, closed vesicles composed of lipid bilayers were formed (J. Mol. Biol. 13,238 (1965)), these vesicles have been called liposomes and in recent years, their preparation method and application in various fields have energetically been investigated. In addition, it has recently also been found that besides phospholipids, highly molecular-designed artificial synthetic lipids (amphiphilic substances having molecular weight of about 1,000) form vesicles like liposomes (J. H. Fendler, "Membrane Mimetic Chemistry", John Wiley & Sons, N.Y., (1982)). Liposomes are noted very widely in the fields of clinical examinations, diagnosis, medicines, etc. because of their biocompatibility, not only as mere models of functions and structural characteristics of cells but also as artificial erythrocytes, a means for introducing genetic information into protoplasts in genetic engineering, carriers for immobilizing enzymes, and drug delivery systems for developing and improving remedies for cancer and other incurable diseases.

BSPR:
As conventional methods for preparing encapsulating liposomes, there have been reported many methods such as the most fundamental method comprising formation of a lipid thin film, followed by treatment by vortexing (A. D. Bangham et al, J. Mol. Biol., 13, 238 (1965)), sonication or the like (C. Hudng et al, Biochemistry, 8, 344 (1969)), the reverse-phase evaporation method (REV method) using organic solvents (F. Szoka et al, Proc. Natl. Acad. Sci., U.S.A., 75, 4194 (1978)), the ethanol infusion method (S. Batzri et al, Biochem. Biophs. Acta., 298, 1015 (1973)), the ether infusion method (D. Deamer et al, Biochim. Biophys. Acta., 443, 629 (1976)), and methods using surfactants (J. R. Slack et al, Biochim. Biophys. Acta., 323, 547 (1973)). Various types of liposomes can be prepared by these preparation methods. Liposomes range in size widely from 0.02 to 10 .mu.m diameter, and according to their size and structure, they are usually roughly divided into three types, namely, multilamellar vesicles (abbreviated as MLVs, 0.3 to 10 .mu.m in diameter), small unilamellar vesicles (abbreviated as SUVs, 0.025 to 0.1 .mu.m in diameter), and large unilamellar vesicles (abbreviated as LUV, 0.2 to 2.0 .mu.m in diameter) (F. Szoka et al, Ann. Rev. Biophys. Bioeng., 9, 467 (1980)). In addition to them, there are oligolamellar vesicles, and liposomes obtained particularly by the REV method are separately dealt with as reverse-phase evaporation vesicles (abbreviated as REVs) in some cases. The encapsulation efficiency indicated the rate of retention of encapsulated substances in liposomes, and is defined as the volume of water held per mole of lipid. This value varies depending on the kind of liposome, and now it is considered that liposomes prepared by the REV method have the highest encapsulation efficiency and that LUV is the second to be able to encapsulate proteins and nucleic acids. However, any of these liposomes obtained by conventional preparation methods are not always sufficient in captured volume for encapsulating high-molecular-weight substances such as enzyme proteins, and the advent of liposomes having a larger captured volume and a higher encapsulation efficiency has been eagerly waited for in consideration of application in the field of medical treatment, diagnosis, clinical examinations, etc., for example, encapsulation of expensive drugs in liposomes and preparation of highly sensitive diagnostic pharmaceutical compositions.

DEPR:
As a method for producing the liposomes of this invention, there may be exemplified all the per se well-known methods for producing liposomes, for example, heretofore well known methods such as the vortexing method, sonication method, surfactant method, reverse-phase evaporation method (REV method), ethanol infusion method, ether infusion method, pre-vesical method, French press extrusion method, Ca.sup.2+ fusion method, annealing method, freeze-thaw-fusion method, W/O/W emulsion method, etc.; methods such as the stable plurilamellar vesicle method (SPLV method) recently reported by S. M. Gruner et al. (Biochemistry, 24, 2833 (1985)); and methods for preparing liposomes called "giant liposomes" which have a large captured volume.

DEPR:
A method for producing the functionallized liposomes of this invention is explained below in detail by taking the case of the surfactant method.

DEPR:
First, such phospholipids and cholesterols described above are dissolved in an organic solvent (e.g., chloroform, an ether, an alcohol, etc.), and the resulting solution is concentrated to dryness under reduced pressure and then sufficiently dried under reduced pressure in a desiccator. Subsequently, an aqueous surfactant solution (10 mM to 500 mM) is added to the lipid film thus formed and the film is uniformly dispersed thereinto. The surfactant used here includes, for example, those heretofore often used such as cholic acid, Tritons, octyl glucoside, etc., though surfactants having a high critical micelle concentration (CMC) such as octyl glucoside and the like are preferred. Next, LPS, an LPS-like compound or the like which is the key to the method of this invention is added in powder form as it is or in solution, followed by adding thereto a solution of a desired substance to be encapsulated (e.g., an enzyme), and the resulting mixture is sufficiently stirred. It is most preferable to remove the surfactant immediately after the stirring, and a method for the removal includes per se well-known methods such as dialysis, gel filtration, absorption on resin, etc. As to the treatment conditions, the treatment time is 1 to 24 hours, and treatment temperature may be properly selected in the range of about 0.degree. to about 70.degree. C. though it is somewhat varied depending on the constitutive material for liposomes, the properties (stability, etc.) of the substance to be encapsulated, etc. In order to remove LPS or the like and the substance which have not been encapsulated, it is recommendable to select a removal method from the above-mentioned method depending on the kind of the substance to be encapsulated, as follows. When the substance to be encapsulated is a low-molecular-weight substance, the removal is carried out by dialysis, gel filtration through Sephadex G-50, etc. and when it is a high-molecular-weight substance, the removal is carried out by gel filtration through Sepharose 4B, centrifugation, etc. The liposomes thus obtained are used or stored after being concentrated by ultrafiltration or the like so as to have a predetermined concentration. For making the sizes of the liposomes uniform, a method using a generally used polycarbonate membrane may be employed, though a gel filtration (using, for example, Sephacryl S-1000) is also effective.

DEPR:
Also when the functionallized liposomes of this invention are produced by a method other than the surfactant method, it is sufficient that they are produced similarly according to a per se well-known method or other methods for producing liposomes, except for the presence of an amphiphilic compound such as LPS, an LPS-like compound or the like.

DEPR:
The functionallized liposomes encapsulating AP of this invention have very interesting properties different from those of conventional liposomes containing no LPS. That is to say, these liposomes generally undergo lysis of a surfactant, resulting in recovery of the activity of encapsulated enzyme, but when a substance having a high affinity for LPS such as polymyxin is used, conventional liposomes hardly undergo lysis and only the liposomes containing LPS of this invention (LPS-liposomes) undergo lysis specifically.

DEPR:
The numerical values in Tables 1a and 1b shows relative values of AP activity per mole of phospholipid determined by taking the AP activity in the case of surfactant method according to a conventional method as 100.

DEPR:
To 10 .mu.l of a liposome (LPS-liposome) dispersion of this invention obtained by the surfactant method using egg yolk lecithin was added 100 .mu.l of a polymyxin B solution having a predetermined concentration, followed by adding thereto 3 ml of 2 mM p-nitrophenylphosphate, and the resulting mixture was incubated at 37.degree. C. for 30 minutes, after which absorbance at 410 nm was measured, whereby the lysis behavior was investigated.

DEPR:
The retention rate of AP activity was calculated by determining the encapsulated amounts of AP before and after the attachment of IgG from lysis by a surfactant (Briji 58).

DEPC:
Preparation of LPS-liposomes (surfactant method using egg yolk lecithin)

DEPC:
Preparation of LPS-liposomes (Surfactant method using DPPC)

DEPC:
Determination of encapsulated amount (AP activity) in liposomes from lysis by surfactant (Briji 58)

DETL:
TABLE 1a _____ The amount of AP encapsulated in LPS- liposomes prepared using egg yolk lecithin (determined by Briji 58 lysis assay) Preparation Conventional LPS method method method
_____ Surfactant method 100 441 Vortexing method 30 104 REV method 1290 2670 SPLV method 670 1070

_____

DETL:
TABLE 1b _____ The amount of AP encapsulated in LPS-liposomes prepared using DPPC (determined by Briji 58 lysis assay) Preparation Conventional LPS method method method
_____ Surfactant method 100 2490 Vortexing method 690 1033 REV method 18400 38300 SPLV method 9670 15300

_____

CLPR:
14. A process according to claim 13, wherein said liposomes are formed in the presence of an amphiphilic compound having a molecular weight of about 5,000 to 30,000 by a method selected from the group consisting of vortexing, sonication, surfactant, treatment reverse-phase evaporation (REV), prevesicle, French press extrusion, Ca.sup.2+ fusion, annealing, freeze-thaw, w/o/w emulsion and stable plurimellar vesicle.

L1: Entry 29 of 57 File: USPT Mar 2, 1993

DOCUMENT-IDENTIFIER: US 5190762 A
TITLE: Method of administering proteins to living skin cells

BSPR:
The liposomes may be of various sizes and may have either one or several membrane layers separating the internal and external compartments. The most important elements in liposome structure are that a sufficient amount of enzyme be sequestered so that only one or a few liposomes are required to enter each cell for delivery of the DNA repair enzyme, and that the liposome be resistant to disruption. Liposome structures include small unilamellar vesicles (SUVs, less than 250 angstroms in diameter), large unilamellar vesicles (LUVs, greater than 500 angstroms in diameter), and multilamellar vesicles (MLs). In the examples presented below, SUVs are used to administer DNA repair enzymes. SUVs can be isolated from other liposomes and unincorporated enzyme by molecular sieve chromatograpy, which is precise but time consuming and dilutes the liposomes, or differential centrifugation, which is rapid but produces a wider range of liposome sizes.

L1: Entry 23 of 57 File: USPT Dec 21, 1993

DOCUMENT-IDENTIFIER: US 5272079 A
TITLE: Purification and administration of DNA repair enzymes

DEPR:
The liposomes may be of various sizes and may have either one or several membrane layers separating the internal and external compartments. The most important elements in liposome structure are that a sufficient amount of enzyme be sequestered so that only one or a few liposomes are required to enter each cell for delivery of the DNA repair enzyme, and that the liposome be resistant to disruption. Liposome structures include small unilamellar vesicles (SUVS, less than 250 angstroms in diameter), large unilamellar vesicles (LUVS, greater than 500 angstroms in diameter), and multilamellar vesicles (MLs). In the examples presented below, SUVs are used to administer DNA repair enzymes. SUVs can be isolated from other liposomes and unincorporated enzyme by molecular sieve chromatography, which is precise but time consuming and dilutes the liposomes, or differential centrifugation, which is rapid but produces a wider range of liposome sizes.

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